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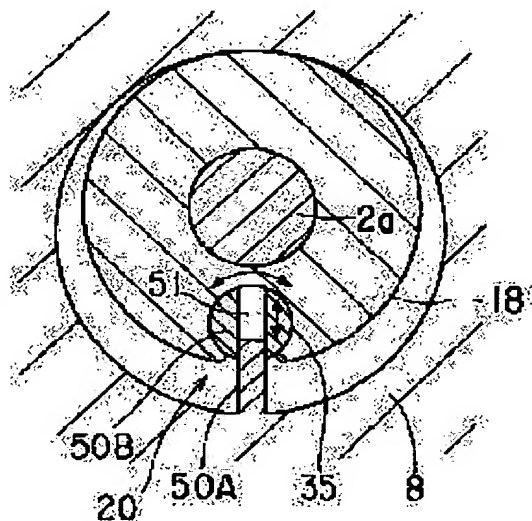
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(54) FLUID MACHINE

(57)Abstract:

PROBLEM TO BE SOLVED: To lessen man-hours, and reduce costs by lessening the formation in number as much as possible wherein reciprocating and sliding motions are performed as a rotation restricting member against a revolution part, and to commonly use parts such as a blade stopper and the like as the other functional part.

SOLUTION: This fluid machine is equipped with bearing fixtures 10 and 11, a cylinder 8 fixed to the bearing fixtures 10, 11, and with a roller 18 which is eccentrically disposed in the inside of the cylinder, and transfers working fluid by revolving with respect to the cylinder. And it also includes a rotation restricting member 20 which is reciprocated so as to be slid only with either one of a revolution part or a non-revolution part to restrict the rotation of the revolution part by using the roller 18 as the revolution part, and the cylinder 8 as the non-revolution part.



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CLAIMS

[Claim(s)]

[Claim 1] The cylinder of the shape of a cylinder which is fixed to a bearing implement and this bearing implement, or is supported free [rotation], In the fluid machinery equipped with the roller or the Rota piston which transports a working fluid by carrying out eccentricity, and being arranged in this cylinder, and making orbital motion to a cylinder The fluid machinery which carries out reciprocation sliding only with either of the components non-revolving around the sun, such as revolution components, such as the above-mentioned roller or the Rota piston, and a bearing implement, or a cylinder, and is characterized by providing the rotation specification-part material which regulates rotation of the above-mentioned revolution components.

[Claim 2] The above-mentioned rotation specification-part material is a fluid machinery according to claim 1 characterized by carrying out rotation sliding while carrying out reciprocation sliding with either the above-mentioned revolution components or the above-mentioned components non-revolving around the sun.

[Claim 3] The above-mentioned rotation specification-part material carries out reciprocation sliding with either the above-mentioned revolution components or the above-mentioned components non-revolving around the sun, and revolution components or the components non-revolving around the sun are the fluid machinery according to claim 1 characterized by carrying out rotation sliding with another side either.

[Claim 4] It is the fluid machinery according to claim 1 which the blade which made the pitch reduce to an other end side gradually from an end side while being wound spirally intervenes between the above-mentioned revolution components and the components non-revolving around the sun, and is characterized by the above-mentioned rotation specification-part material making the blade stopper which regulates migration of the direction of a spiral of the above-mentioned blade serve a double purpose.

[Claim 5] The above-mentioned rotation specification-part material is a fluid machinery according to claim 1 characterized by making the siphon pump which refuels each sliding section of the above-mentioned revolution components and the above-mentioned components non-revolving around the sun in a lubricating oil serve a double purpose.

[Claim 6] The above-mentioned rotation specification-part material is a fluid machinery according to claim 1 characterized by the cross-section configuration of each sliding section of the above-mentioned revolution components and the above-mentioned components non-revolving around the sun being circular.

[Claim 7] The above-mentioned rotation specification-part material, and the above-mentioned

revolution components or the above-mentioned components non-revolving around the sun are a fluid machinery according to claim 1 characterized by choosing the thing of the mutually different quality of the material.

[Claim 8] The above-mentioned rotation specification-part material is a fluid machinery according to claim 1 characterized by surface treatment or heat-treating.

[Claim 9] The cylinder of the shape of a cylinder which is fixed to a bearing implement and this bearing implement, or is supported free [rotation], In the fluid machinery equipped with the roller or the Rota piston which transports a working fluid by carrying out eccentricity, and being arranged in this cylinder, and making orbital motion to a cylinder The fluid machinery characterized by providing the rotation specification-part material of the components non-revolving around the sun, such as revolution components, such as the above-mentioned roller or the Rota piston, and the above-mentioned bearing implement, or a cylinder, which regulates rotation of the above-mentioned revolution components by actuation other than either and reciprocation sliding at least.

[Claim 10] The above-mentioned rotation specification-part material is a fluid machinery according to claim 9 characterized by the thing of the above-mentioned revolution components or the above-mentioned components non-revolving around the sun done for rotation sliding with either at least.

[Claim 11] The above-mentioned rotation specification-part material is a fluid machinery according to claim 9 characterized by the part consisting of elastic bodies at least.

[Claim 12] It is the fluid machinery according to claim 9 which the blade to which covered the other end side from the end side, and the pitch was made to reduce gradually while being wound spirally intervenes between the above-mentioned revolution components and the components non-revolving around the sun, and is characterized by the above-mentioned rotation specification-part material making the blade stopper which regulates migration of the direction of a spiral of the above-mentioned blade serve a double purpose.

[Claim 13] The above-mentioned rotation specification-part material is a fluid machinery according to claim 9 characterized by consisting of swivel-joint splices.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the fluid machinery which is the helical blade type compressor which constitutes the refrigerating cycle of an air conditioner.

[0002]

[Description of the Prior Art] In recent years, the helical blade type compressor which is a compressor which constitutes the refrigerating cycle of an air conditioner as a fluid machinery is proposed. While according to this kind of compressor being able to remove the poor seal nature in a conventional reciprocating type and a conventional rotary system compressor, raising seal

nature by the comparatively easy configuration and making efficient compression, manufacture and the assembly of components are easy-ized.

[0003] In such a helical blade type compressor, two kinds of compression device sections are developed recently. A roller is arranged off center in the cylinder by which fixed support of one of these is carried out in both ends at a bearing implement. A spiral slot is formed in the peripheral face of this roller, and a blade is inserted in it free [receipts and payments]. The refrigerant gas which is a compressed fluid is introduced and compressed into the compression space formed between this blade, a cylinder, and a roller.

[0004] The Rota piston is arranged off center in the cylinder which another side is supported for both ends by the bearing implement, enabling free rotation, and is connected with a driving source. A spiral slot is formed in the peripheral face of this roller piston, and a blade is inserted in it free [receipts and payments]. The refrigerant gas which is a compressed fluid is introduced and compressed into the compression space formed between this blade, a cylinder, and the Rota piston.

[0005]

[Problem(s) to be Solved by the Invention] By the way, the roller or the Rota piston which carries out eccentricity, is arranged and transports a refrigerant gas into the above-mentioned cylinder makes orbital motion to a cylinder to the location of the above-mentioned bearing implement and a cylinder being fixed.

[0006] That is, it can divide roughly into two kinds of the above-mentioned roller or the revolution components like the Rota piston, and the components non-revolving around the sun, such as the above-mentioned bearing implement and a cylinder, in such the compression device section.

[0007] Moreover, even if it is which configuration, in order to aim at improvement in compression efficiency, it is necessary to regulate rotation of the above-mentioned revolution components. The Oldham device in which the rotation regulation means against the conventional revolution components is made to drawing 16 is shown.

[0008] That is, the Oldham ring C intervenes between a roller A end face and a bearing implement B end face. It is inserted in the long slot e which the protruding line d of a pair is formed in the direction which intersects perpendicularly with both sides of this Oldham ring C mutually, and is established in the roller A which counters, respectively, and the bearing implement B free [reciprocation].

[0009] If it is such an Oldham device, rotation of the roller A which are revolution components is certainly controllable. the bearing implement B which are the revolution components A and the components non-revolving around the sun on the other hand -- it is necessary to prepare the reciprocation sliding section which is alike, respectively and consists of a protruding line d and a long slot e, and management of those dimensional accuracy is severe. Therefore, processing and assembly took time and effort, increase of a man day was caused, and it has had the bad influence on cost.

[0010] Furthermore, the blade stopper which regulates migration of the direction of a spiral of the above-mentioned blade is required for this kind of compression device section, and the siphon pump for supplying with oil to each sliding section is also required for it, it must be separately equipped with the components of dedication, respectively, and is in the inclination for the bad influence which it has on cost to be weighted.

[0011] While this invention is made paying attention to the above-mentioned situation, and the place made into the purpose lessens the configuration which carries out reciprocation sliding as much as possible to the member which regulates rotation of revolution components and obtaining reduction and low-cost-izing of a man day, it is in offering the fluid machinery which enabled the combination with other functional parts, such as a blade stopper, for example.

[0012]

[Means for Solving the Problem] In order to satisfy the above-mentioned purpose the fluid machinery of the 1st invention The cylinder of the shape of a cylinder which is fixed to a bearing implement and this bearing implement, or is supported free [rotation] as claim 1, It has the roller or the Rota piston which transports a working fluid by carrying out eccentricity, and being

arranged in this cylinder, and making orbital motion to a cylinder. Reciprocation sliding is carried out only with either of the components non-revolving around the sun, such as revolution components, such as the above-mentioned roller or the Rota piston, and a bearing implement, or a cylinder, and it is characterized by providing the rotation specification-part material which regulates rotation of the above-mentioned revolution components.

[0013] In order to satisfy the above-mentioned purpose the fluid machinery of the 2nd invention The cylinder of the shape of a cylinder which is fixed to a bearing implement and this bearing implement, or is supported free [rotation] as claim 9, In the fluid machinery equipped with the roller or the Rota piston which transports a working fluid by carrying out eccentricity, and being arranged in this cylinder, and making orbital motion to a cylinder It is characterized by providing the rotation specification-part material of the components non-revolving around the sun, such as revolution components, such as the above-mentioned roller or the Rota piston, and the above-mentioned bearing implement, or a cylinder, which regulates rotation of the above-mentioned revolution components by actuation other than either and reciprocation sliding at least.

[0014] While lessening the configuration which slides free [reciprocation] as much as possible in regulating the rotation to revolution components by adopting a means to solve such a technical problem and obtaining low cost-ization, it becomes possible, for example about the combination with other functional parts, such as a blade stopper.

[0015]

[Embodiment of the Invention] Hereafter, the gestalt of 1 operation of this invention is explained with reference to a drawing. Drawing 1 is the so-called helical blade type compressor which is a fluid machinery. It comes to hold the compression device section 3 and the motor section 4 by which this helical blade type compressor is connected through a revolving shaft 2 in the sealing case 1.

[0016] The regurgitation refrigerant pipe 6 is connected to the upper limit section of the above-mentioned sealing case 1, it absorbs to a lateral portion and a refrigerant pipe 7 is connected. It absorbs from the above-mentioned regurgitation refrigerant pipe 6, and a refrigerant pipe 7 is covered, one by one, an evaporator is connected with a condenser and an expansion valve through a refrigerant pipe (neither is illustrated), and the refrigerating cycle of an air conditioner consists of these.

[0017] Next, the above-mentioned compression device section 3 is explained in full detail. Eight in drawing is a cylinder, and fitting of the flange 8a which protrudes on the peripheral face of this cylinder 8 at one is carried out to the sealing case 1 above-mentioned inner circle wall, and it is attached and fixed with a welding means from a sealing case 1 periphery side.

[0018] Upper limit opening of the above-mentioned cylinder 8 is blockaded by the main shaft receptacle implement 10, and lower limit opening is blockaded by the countershaft receptacle implement 11. A revolving shaft 2 supports the above-mentioned main shaft receptacle implement 10 to revolve for pars intermedia, enabling almost free rotation, and the above-mentioned countershaft receptacle implement 11 supports the lower limit section of a revolving shaft 2 to revolve free [rotation]. The backing plate 14 is attached in the inferior surface of tongue of this countershaft receptacle implement 11, and the lower limit side of a revolving shaft 2 is supported.

[0019] Eccentric crank section 2a, the 1st balancer 16, and the 2nd balancer 17 are formed in revolving-shaft 2 peripheral surface between the main shaft receptacle implement 10 and the countershaft receptacle implement 11. The above-mentioned eccentric crank section 2a carries out eccentricity only of the predetermined distance to the axial center of a revolving shaft 2, and is prepared with it. With the eccentric direction of the above-mentioned eccentric crank section 2a to the axial center of a revolving shaft 2, the 1st and 2nd balancer 16 and 17 of the above is attached in the location of the symmetry, and is formed in an amount of the same quality.

[0020] Eccentricity is carried out into the above-mentioned cylinder 8, and the roller 18 is arranged. The lower limit side of this roller 18 is supported by the above-mentioned countershaft receptacle implement 11, and the eccentricity to revolving-shaft 2 medial axis of a roller 18 is the same as the eccentricity of eccentric crank section 2a.

[0021] The above-mentioned roller 18 is inserted in the above-mentioned eccentric crank section 2a peripheral surface free [rotation] through a sleeve. Therefore, if eccentric crank section 2a carries out eccentric rotation with rotation of a revolving shaft 2, while a roller 18 will carry out eccentric movement, the peripheral face of a roller 18 part is ****(ed) to cylinder 8 inner skin in accordance with shaft orientations.

[0022] Moreover, between the above-mentioned countershaft receptacle implement 11 and the roller 18 lower-limit section, the rotation specification-part material 20 mentioned later is formed, and it controls to regulate rotation of a roller 18 and to make orbital motion.

[0023] A lower limit section side is covered from this upper limit section side, and the spiral slot 23 where a pitch serves as smallness gradually is established in the peripheral surface of the above-mentioned roller 18. The spiral blade 24 is inserted in the spiral slot 23 free [****], and the outer-diameter side of a blade 24 is close at the inner skin of a cylinder 8.

[0024] It is divided into two or more space sections which continued with the blade 24 between the above-mentioned roller 18 and cylinder 8 peripheral surface. These space section is called compression space 25. The volume of each compression space 25 covers the lower part side compression space 25 from the upper part side compression space 25, and is becoming size from a setup of the pitch of the above-mentioned spiral slot 23 gradually.

[0025] The above-mentioned motor section 4 counters the peripheral surface of Rota 30 attached in a revolving shaft 2, and this Rota 30 through a narrow gap, and consists of stators 31 attached in the inner skin of the above-mentioned sealing case 1.

[0026] Thus, it is the helical blade type compressor constituted, and it energizes in the motor section 4 and the rotation drive of the revolving shaft 2 is carried out with Rota 30. The turning effort of a revolving shaft 2 is transmitted to a roller 18 through eccentric crank section 2a.

[0027] Since the above-mentioned rotation specification-part material 20 regulates rotation of a roller 18 as it is mentioned later, this roller 18 makes orbital motion. In connection with the orbital motion of a roller 18, ***** to a cylinder 8 moves to a hoop direction gradually. The above-mentioned blade 24 carries out **** migration radial [of a roller 18], going in and out to the spiral slot 23.

[0028] By these actuation of a series of, a low-pressure refrigerant gas absorbs from an evaporator, and the bottom compression space 25 absorbs through a refrigerant pipe 7. And in connection with the orbital motion of a roller 14, sequential migration is carried out to the compression space 25 by the side of the upper part.

[0029] Since the volume of each above-mentioned compression space 25 covers an upper part side and is carrying out sequential contraction from the lower part side, a refrigerant gas is compressed while sequential migration is carried out, and high-pressure-izes each compression space 25 to place constant pressure in the compression space 25 of the maximum upper limit. The high pressure gas in this compression space 25 is once breathed out in the sealing case 1, after it is full here, it is led to a condenser from the regurgitation refrigerant pipe 6, and a well-known refrigerating cycle operation is performed.

[0030] Thus, in the helical blade type compressor which is constituted and acts, as the above-mentioned rotation specification-part material 20 is described below, it is constituted, and it acts. In addition, here which is revolution components, the rotation specification-part material 20 regulates the rotation to a cylinder 8 here which is the components of a roller 18 non-revolving around the sun. Therefore, the revolution components 18, a call, and a cylinder are hereafter called the components 8 non-revolving around the sun for a roller.

[0031] Drawing 2 shows the rotation specification-part material 20 concerning invention of claim 1 thru/or claim 3 which shows the gestalt of the 1st operation. The above-mentioned rotation specification-part material 20 consists of projection member 50A which projects to the bore side of the components 8 non-revolving around the sun, and rotation member 50B inserted in the revolution components 18 free [rotation]. In addition, if it explains, the above-mentioned projection member 50A consists of a shell or a board, is projected by one from the components 8 non-revolving around the sun, or it is another object, and attaches the end face section in the components 8 non-revolving around the sun with a proper means, and is fixed.

[0032] The above-mentioned rotation member 50B consists of a cylinder object or a solid

sphere, and makes a cross-section circle configuration at least. This shaft-orientations die length is equivalent to the space lay length of projection member 50A. and the cross section which the part prepared in the periphery section of the revolution components 18 opened wide -- the circular concave section 35 -- a hoop direction -- fluctuation ease -- if it puts in another way, it will fit in free [rotation].

[0033] The hole 51 for negotiations is penetrated and formed in this rotation member 50B covering the direction of a path, and a part of above-mentioned projection member 50A is in an insertion condition irrespective of the location of the revolution member 18. That is, projection member 50A is inserted in the hole 51 for negotiations free [reciprocation].

[0034] A deer is carried out, and from the condition which has ***** to the components 8 of the revolution components 18 non-revolving around the sun in the topmost part as shown in drawing, if the revolution components 18 tend to carry out eccentric rotation in the direction of a clockwise rotation, the location of rotation member 50B inserted in the revolution components 18 will also be changed.

[0035] On the other hand, since the location of projection member 50A inserted in the hole 51 for negotiations of rotation member 50B does not change, after 90 degrees of revolving shafts 2 have rotated, to rotation member 50B, only the part rotates and the revolution components 18 incline.

[0036] The hole 51 for negotiations inserts in projection member 50A deeply at coincidence, and it **** to the location this protrusion end face of whose is abbreviation one half extent of the hole 51 for negotiations. If 90 more degrees rotates, ***** to the components 8 of the revolution components 18 non-revolving around the sun will change to the location of 180-degree opposite side of drawing, and projection member 50A will be most deeply inserted in the hole 51 for negotiations.

[0037] In connection with changing further ***** to the components 8 of the revolution components 18 non-revolving around the sun in the direction of a clockwise rotation from this location, it moves in the direction to which the hole 51 for negotiations of rotation member 50B escapes from and comes out of projection member 50A shortly.

[0038] If it puts in another way, double action of the rotation member 50B will be carried out with the revolution components 18. And double action is completed, it changes to **** in the place from which ***** to the components 8 of the revolution components 18 non-revolving around the sun returned to the condition of drawing, and the operation described previously below is repeated.

[0039] Rotation member 50B of the revolution components 18 and one carries out reciprocation sliding to projection member 50A of the components 8 non-revolving around the sun and one, and rotation member 50B carries out rotation sliding with the revolution components 18, regulates the rotation to the revolution components 18, and makes orbital motion perform in the rotation specification-part material 20 after all.

[0040] In addition, you may change to rotation specification-part material 20A as shown in drawing 3 as a modification in the gestalt of implementation of the above 1st. namely, the cross section where the part prepared in the components 8 non-revolving around the sun opened wide rotation member 50B which projection member 50A projects, is carried out from the peripheral surface of the revolution components 18 here, and has the hole 51 for negotiations -- it is inserted in the circular concave section 36 free [rotation].

[0041] Thus, projection member 50A of the revolution components 18 and one carries out reciprocation sliding to rotation member 50B of the components 8 non-revolving around the sun and one, and rotation member 50B carries out rotation sliding with the components 8 non-revolving around the sun, regulates the rotation to the revolution components 18, and makes orbital motion perform by having rotation specification-part material 20A constituted.

[0042] Drawing 4 shows rotation specification-part material 20B of the gestalt of the 2nd operation concerning invention of claim 1 thru/or claim 3. This rotation specification-part material 20B consists of height 55b inserted in the slot 37 for negotiations which protrudes on one from rotation section 55a inserted in the concave section 36 of the cross-section circle configuration where the part prepared in the components 8 non-revolving around the sun is

opened wide, free [rotation], and this rotation section 55a, and is prepared in the direction of a path from revolution components 18 peripheral surface free [reciprocation].

[0043] In this case, to the slot 37 for negotiations of the revolution components 18, height 55b carries out rotation sliding of the reciprocation sliding to the components 8 non-revolving around the sun, and regulates the rotation to the revolution components 18, and nothing and rotation section 55a make orbital motion perform.

[0044] In addition, you may change to rotation specification-part material 20C as shown in drawing 5 as a modification in the gestalt of implementation of the above 2nd. That is, rotation section 55a is inserted in the concave section 39 prepared in the revolution components 18 free [rotation] here, and height 55b of this and one is inserted in the slot 38 for negotiations established in the components 8 non-revolving around the sun free [reciprocation].

[0045] Thus, to the slot 38 for negotiations of the components 8 non-revolving around the sun, height 55b carries out rotation sliding of the reciprocation sliding to the revolution components 18, and regulates the rotation to the revolution components 18, and nothing and rotation section 55a make orbital motion perform by having rotation specification-part material 20C constituted.

[0046] Drawing 6 shows rotation specification-part material 20D of the gestalt of the 3rd operation concerning invention of claim 1 thru/or claim 3. The above-mentioned rotation specification-part material 20D is prepared in the components 8 non-revolving around the sun, and consists of a rotation lever 61 inserted in the concave section 40 of the shape of a cross section of about U characters opened to this inner skin free [rotation] through the pivotable support pin 60.

[0047] The width method of the concave section 40 is formed in large width of face with sufficient allowances to the width method of the rotation lever 61, therefore the rotation lever 61 can be freely rotated in the range of a predetermined include angle in the concave section 40. The edge which projects from non-revolving around the sun components 8 bore of the rotation lever 61 is inserted in the slot 41 for negotiations established in the revolution components 8 free [reciprocation].

[0048] In this case, while the rotation lever 61 makes reciprocation sliding to the slot 41 for negotiations of the revolution components 18, it rotates to the components 8 non-revolving around the sun by using the pivotable support pin 60 as the supporting point, and the rotation to the revolution components 18 is regulated, and orbital motion is made to perform.

[0049] In addition, you may change to rotation specification-part material 20E as shown in drawing 7 as a modification in the gestalt of implementation of the above 3rd. That is, the end section of the rotation lever 61 is supported pivotably by the revolution components 18 free [rotation] through the pivotable support pin 60, and the other end of this rotation lever 61 is multiplied by the slot 43 for negotiations established in the components 8 non-revolving around the sun free [reciprocation] here.

[0050] Thus, although rotation lever 61 edge rotates reciprocation sliding to the revolution components 18 by having rotation specification-part material 20E constituted to the slot 43 for negotiations of the components 8 non-revolving around the sun, nothing and the rotation lever 61 regulate the rotation to the revolution components 18, and make orbital motion performed.

[0051] Drawing 8 (A) and (B) show the rotation specification-part material 20F and 20G of the gestalt of the 4th operation concerning invention of claim 4. First, when it explains from rotation specification-part material 20F of drawing 8 (A), it consists of projection member 50A which projects to the bore side of the components 8 non-revolving around the sun, and rotation member 50B inserted in the revolution components 18 free [rotation]. The hole 51 for negotiations is formed in this rotation member 50B, and a part of projection member 50A is inserted in free [reciprocation].

[0052] Thus, the configuration of rotation specification-part material 20F is completely the same as that of the thing of a configuration of that drawing 2 explained previously, and good. Here, it is the description as a fitting location of rotation specification-part material 20F that blade 24 end face and the location which counters are chosen.

[0053] That is, the above-mentioned projection member 50A is projected at the edge of the components 8 non-revolving around the sun, and rotation member 50B is multiplied by concave

section 35a prepared in the edge of the revolution components 18. From this, the side face of projection member 50A counters with blade 24 end face.

[0054] Therefore, while rotation specification-part material 20F regulates rotation of the revolution components 18, it fixes the end face of the blade 24 which is going to move in the direction of a spiral in connection with the orbital motion of the revolution components 18, and makes the blade stopper which makes this migration regulation serve a double purpose.

[0055] G is prepared in the components 8 non-revolving around the sun, and it consists of a rotation lever 61 inserted in the rotation specification-part material shown in drawing 8 (B) 20 cross-section [which is opened to this inner skin / of about U characters]-like concave section 40 free [rotation] through the pivotable support pin 60.

[0056] Thus, the configuration of rotation specification-part material 20G is completely the same as that of the thing of a configuration of that drawing 6 explained previously, and good. Here, it is the description as a fitting location of rotation specification-part material 20G that blade 24 end face and the location which counters are chosen.

[0057] That is, the above-mentioned rotation lever 61 is multiplied by the slot 41 for negotiations established in the edge of the revolution components 18 while it projects from the edge of the components 8 non-revolving around the sun. From this, the side face of the rotation lever 61 counters with blade 24 end face.

[0058] Therefore, while this rotation specification-part material 20G regulates rotation of the revolution components 18, it fixes the end face of the blade 24 which is going to move in the direction of a spiral in connection with the orbital motion of the revolution components 18, and makes the blade stopper which makes this migration regulation serve a double purpose.

[0059] Rotation specification-part material 20H of the gestalt of the 5th operation concerning invention of claim 5 is shown in drawing 9 (A) and (B). This rotation specification-part material 20H consists of rotation member 50C inserted in the concave section 35 of the components 8 non-revolving around the sun free [rotation], and projection member 50A which protrudes on the revolution components 8 and is inserted in the hole 51 for negotiations of rotation member 50C.

[0060] And the branching hole 44 which is open for free passage in this halfway section is formed in rotation member 50C towards intersecting perpendicularly with the hole 51 for negotiations. Moreover, while oil sucking way 45a which opens for free passage the oil sump section 5 of the lubricating oil shown in the components 8 non-revolving around the sun at the concave section 35 and drawing 1 R> 1 is prepared, oil supply way 45b which opens each sliding section and the concave section 35 of the revolution components 18 and the components 8 non-revolving around the sun for free passage is prepared.

[0061] The location where the opening end position of oil sucking way 45a and oil supply way 45b conflicts mutually is chosen to the above-mentioned concave section 35, and the above-mentioned oil sucking way 45a is open for free passage with the branching hole 44 depending on the location of rotation member 50C, and the above-mentioned oil supply way 45b is open for free passage with the hole 51 for negotiations depending on the location of rotation member 50C.

[0062] As shown in drawing 9 (A), when it inclines to a predetermined include angle in the condition of moving in the direction out of which projection member 50A escapes from and comes in connection with the orbital motion of the revolution components 18 (namely, double action), the branching hole 44 and oil sucking way 45a are open for free passage.

[0063] this time -- oil supply way 45b -- receiving -- the object for negotiations -- it is in the location where the hole 51 edge shifted, and both the edges of oil supply way 45b and the hole 51 for negotiations are in a closing condition mutually. Therefore, so to speak, the branching hole 44 and the hole 51 for negotiations will be in a negative pressure condition, and the lubricating oil of the oil sump section 5 will be sucked up through oil sucking way 45a.

[0064] The hole 51 for negotiations and the branching hole 44 are covered with the sucked-up lubricating oil. Furthermore, in the condition that the revolution components 18 incline with projection member 50A in connection with the orbital motion of the revolution components 18, and projection member 50A inserts into the hole 51 for negotiations (namely, ****), the location

to oil sucking way 45a of the branching hole 44 shifts, and it is closed mutually.

[0065] Since the hole 51 for negotiations is open for free passage to oil supply way 45b and **** of projection member 50A continues on the other hand, the lubricating oil collected on the hole 51 for negotiations and the branching hole 44 is pressed by projection member 50A, is led to oil supply way 45b, and is further refueled by each sliding section.

[0066] Thus, while rotation specification-part material 50C regulates rotation of the revolution components 18 on the assumption that prepare oil sucking way 45a in the components 8 non-revolving around the sun, and the oil sump section 5 is made open for free passage, and oil supply way 45b is prepared and it is open for free passage in each sliding section, a siphon pump is made to serve a double purpose.

[0067] As a gestalt of the operation concerning invention of claim 6, the cross section of the hole 51 for negotiations which negotiates with this about projection member 50A explained by drawing 2 thru/or drawing 9 , height 55b, and the rotation lever 61 using a round bar-like thing altogether, and the slots 37, 38, and 41 for negotiations is made as it is circular.

[0068] By this, these manufacture processings become easy and it contributes to the further low cost-ization. As a gestalt of the operation concerning invention of claim 7, the rotation specification-part material 20, 20A-20H explained by drawing 2 thru/or drawing 9 , and the revolution components 18 and the components 8 non-revolving around the sun are formed from the thing of the mutually different quality of the material.

[0069] By this, the degree of hardness to the non-going slide member of projection member 50A which is a reciprocation slide member, height 55b, and the rotation lever 61 can become high, it can be equal to wear, reinforcement can be obtained, and improvement in dependability can be aimed at.

[0070] projection member 50A explained by drawing 2 thru/or drawing 9 as a gestalt of the operation concerning claim 8, height 55b, and all the rotation levers 61 — surface treatment is made for a peripheral surface. Or it heat-treats.

[0071] By this, the degree of hardness to the non-going slide member of projection member 50A which is a reciprocation slide member, height 55b, and the rotation lever 61 can become high, it can be equal to wear, reinforcement can be obtained, and improvement in dependability can be aimed at.

[0072] Rotation specification-part material 20J of the gestalt of the 6th operation concerning invention of claim 9 and claim 10 is shown in drawing 10 . The end section is supported pivotably by the revolution components 18 free [rotation] through the pivotable support pin 52, and rotation specification-part material 20J consists of a lever 54 about which it negotiates with the pin 53 for long holes by which the other end is prepared in the components 8 non-revolving around the sun.

[0073] That is, although a lever 54 uses the pivotable support pin 52 of the end section as the supporting point and its other end is pivotable, the other end of a lever 54 is movable within the limits of long hole 54 from place about which long hole 54a prepared here negotiates with pin 53 for long holes a.

[0074] It is such rotation specification-part material 20J, and as shown in drawing, when ***** of the revolution components 18 to the components 8 non-revolving around the sun is in the topmost part, the pin 53 for long holes has multiplied by the lowest edge of lever long hole 54a.

[0075] After ***** of the revolution components 18 to the components 8 non-revolving around the sun has moved to the bottom of 180-degree opposite side with drawing, the pin 53 for long holes changes to the maximum upper limit of lever long hole 54a. The pin 53 for long holes is in the pars intermedia of lever long hole 54a between these.

[0076] While a lever 54 moves within the limits of long hole 54a to the pin 53 for long holes prepared in the components 8 non-revolving around the sun by having the above-mentioned rotation specification-part material 20J, rotation sliding is carried out to the pivotable support pin 52 prepared in the revolution components 18, the rotation to the revolution components 18 is regulated, and orbital motion is made performed.

[0077] Rotation specification-part material 20K of the gestalt of the 7th operation concerning

invention of claim 11 is shown in drawing 11 . This rotation specification-part material 20K consists of a wire spring 56 which is the elastic body which is multiplied by pin 52a by which end section 56a is prepared in the revolution components 18, and is multiplied by pin 53a by which other end 56b is prepared in the components 8 non-revolving around the sun.

[0078] That is, the both ends 56a and 56b are wound two or more turns every, and the wire spring 56 is multiplied by Pins 52a and 52b, respectively. Since it is a wire-like, elastic deformation will be carried out if the force from each edges 56a and 56b to the inside is energized.

[0079] When a deer is carried out and ***** to the components 8 of the revolution components 18 non-revolving around the sun is changed, while one edge 56b of the wire spring 56 is immobilization, other-end section 56a is changed.

[0080] Therefore, the halfway section of the wire spring 56 carries out elastic deformation, on the whole, bends, regulates the rotation in the revolution components 18, and makes orbital motion perform. Namely, as for rotation specification-part material 20L, any of the revolution components 18 and the components 8 non-revolving around the sun regulate rotation of the revolution components 18 by actuation other than reciprocation.

[0081] Rotation specification-part material 20L of the gestalt of the 8th operation concerning invention of claim 11 is shown in drawing 12 . This rotation specification-part material 20L consists of coil springs 59 of the pair which is the elastic body continued and prepared in the concave section 57 of the pair prepared in the part in revolution components 18 peripheral face which counters 180 degrees, the concave section 58 prepared in the part in non-revolving around the sun components 8 inner skin which counters 180 degrees, and the concave section 57 of the revolution components 18 and the concave section 58 of the components 8 non-revolving around the sun which counter mutually.

[0082] When using the above-mentioned coil spring 59 as an extension spring, with a proper means, it attaches in each concave section 57 and 58 bases certainly, and is fixed to them, and these both ends carry out press energization of the revolution components 18 and the components 8 non-revolving around the sun elastically in the direction approached mutually.

[0083] Moreover, when using a coil spring 59 as compression spring, the whole is made to continue and contact mostly, stability is secured, and these both ends carry out press energization elastically in the direction of each concave section 57 and 58 bases which estranges the revolution components 18 and the components 8 of each other non-revolving around the sun.

[0084] Anyway, while one coil spring 59 carries out a compression set in connection with changing ***** of the revolution components 18 to the components 8 non-revolving around the sun from the place established in the location where 180 degrees of coil springs 59 of a pair counter, the coil spring 59 of another side carries out expanding deformation.

[0085] The revolution components 18 have rotation regulated by the coil spring 59 of a pair after all. That is, rotation specification-part material 20K regulates rotation of the revolution components 18 for any of the revolution components 18 and the components 8 non-revolving around the sun by actuation other than reciprocation also here.

[0086] Rotation specification-part material 20M of the gestalt of the 9th operation concerning invention of claim 11 is shown in drawing 13 . This rotation specification-part material 20M consists of flat spring 72 which is the elastic bodies continued and prepared in the concave section 70 prepared in the predetermined part of revolution components 18 peripheral face, this concave section 70 and the concave section 71 prepared in the non-revolving around the sun components 8 inner-skin part which counters mostly, and the concave sections 70 and 71 which counter mutually.

[0087] The both ends are certainly attached in the base of the concave section 70, and the side face of the concave section 71 through a fixture 73, it is fixed, and the above-mentioned flat spring 72 is carrying out press energization elastically in the direction which estranges the revolution components 18 of each other to the components 8 non-revolving around the sun from the place which is in the condition that crookedness formation was carried out to the shape of about L characters.

[0088] A deer is carried out, and in connection with changing ***** of the revolution components 18 to the components 8 non-revolving around the sun, the other end of the flat spring 72 by which the end section was attached and fixed to the components 8 non-revolving around the sun makes elastic deformation, and regulates rotation of the revolution components 18.

[0089] That is, rotation specification-part material 20M regulates rotation of the revolution components 18 for any of the revolution components 18 and the components 8 non-revolving around the sun by actuation other than reciprocation also here. Rotation specification-part material 20N of the gestalt of the 10th operation concerning invention of claim 12 is shown in drawing 1414.

[0090] Press fit immobilization of that end section is carried out to the inner skin predetermined part of the components 8 non-revolving around the sun, and this rotation specification-part material 20N consists of a piece 74 of press in which the other end is attached through a fixture 75 at the inner skin of the revolution components 18.

[0091] That is, anchoring section 74a in the components 8 of the piece 74 of press non-revolving around the sun is the rigid body which has predetermined board thickness. And anchoring section 74a is attached in the end face of the above-mentioned blade 24, and the location which counters, is inserted in the notch slot 76 established in revolution components 18 end face, and projects in a bore side.

[0092] Moreover, piece section 74b attached in revolution components 18 inner skin of the piece 74 of press is formed in very thin board thickness, and has elasticity. From the configuration, press energization of the revolution components 18 peripheral face is elastically carried out so that non-revolving around the sun components 8 inner skin may be contacted.

[0093] A deer is carried out, and in connection with changing ***** of the revolution components 18 to the components 8 non-revolving around the sun, piece section 74b attached in the revolution components 18 of the piece 74 of press fixed to the components 8 non-revolving around the sun makes elastic deformation, and regulates rotation of the revolution components 18.

[0094] Namely, as for rotation specification-part material 20N, any of the revolution components 18 and the components 8 non-revolving around the sun regulate rotation of the revolution components 18 by actuation other than reciprocation. Moreover, anchoring section 74a which projects in a bore side from the components 8 of the piece 74 of press non-revolving around the sun makes the function of the blade stopper which fixes the end face of a sleeve 24 and regulates migration of the direction of a spiral serve a double purpose.

[0095] Drawing 15 shows rotation specification-part material 20P of the gestalt of the 11th operation concerning invention of claim 13. The above-mentioned rotation specification-part material 20P becomes the swivel-joint splice 77 from this anchoring means. Namely, as for this swivel-joint splice 77, the ball sections 77b and 77c are formed in the both ends of linear part 77a at one. One ball section 77b is inserted in the concave section 78 prepared in the components 11 which are countershaft receptacle implements here non-revolving around the sun free [rotation], and ball section 77c of another side is inserted in the concave section which is prepared in the revolution components 18 and which is not illustrated free [rotation].

[0096] Fluctuation of ***** of the revolution components 18 changes the direction of the swivel-joint splice 77 (sense) from the place which one ball section 77b of the above-mentioned swivel-joint splice 77 has multiplied by the components 11 non-revolving around the sun. That is, as for rotation specification-part material 20P, any of the revolution components 18 and the components 11 non-revolving around the sun will regulate rotation of the revolution components 18 by actuation other than reciprocation sliding.

[0097] In addition, although Rota arranged off center in the cylinder of immobilization applied to the helical blade type fluid compressor which makes orbital motion and explained in the gestalt of each operation mentioned above, it is not limited to this, and while arranging the Rota piston off center in the cylinder by which is connected with a driving source and a rotation drive is carried out, you may apply to the helical blade type fluid compressor (for example, indicated by JP,7-107391,B) of the type which carries out orbital motion. Or a pump, an expansion machine, etc.

which feed not only a compressor but a fluid are applicable to other fluid machineries.

[0098]

[Effect of the Invention] As explained above, while according to this invention lessening the configuration which slides free [reciprocation] as much as possible and obtaining low cost-ization in regulating the rotation to revolution components, it becomes possible about the combination with the functional part of others for example, such as a blade stopper, and while contributing to a cost cut, effectiveness, such as obtaining improvement in manufacturability, is done so.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] The sectional view of the helical blade type compressor which is a fluid machinery concerning the gestalt of 1 operation of this invention.

[Drawing 2] The block diagram of the rotation specification-part material which regulates the rotation of the revolution components to the components non-revolving around the sun concerning the gestalt of the 1st operation.

[Drawing 3] The modification of the gestalt of the 1st operation.

[Drawing 4] The block diagram of the rotation specification-part material which regulates the rotation of the revolution components to the components non-revolving around the sun concerning the gestalt of the 2nd operation.

[Drawing 5] The modification of the gestalt of the 2nd operation.

[Drawing 6] The block diagram of the rotation specification-part material which regulates the rotation of the revolution components to the components non-revolving around the sun concerning the gestalt of the 3rd operation.

[Drawing 7] The modification of the gestalt of the 3rd operation.

[Drawing 8] The block diagram of mutually different rotation specification-part material which makes a blade stopper serve a double purpose concerning the gestalt of the 4th operation.

[Drawing 9] The block diagram of the rotation specification-part material which makes a siphon pump serve a double purpose concerning the gestalt of the 5th operation.

[Drawing 10] The block diagram of the rotation specification-part material which regulates the rotation of the revolution components to the components non-revolving around the sun concerning the gestalt of the 6th operation.

[Drawing 11] The block diagram of the rotation specification-part material which regulates the rotation of the revolution components to the components non-revolving around the sun concerning the gestalt of the 7th operation.

[Drawing 12] The block diagram of the rotation specification-part material which regulates the rotation of the revolution components to the components non-revolving around the sun concerning the gestalt of the 8th operation.

[Drawing 13] The block diagram of the rotation specification-part material which regulates the

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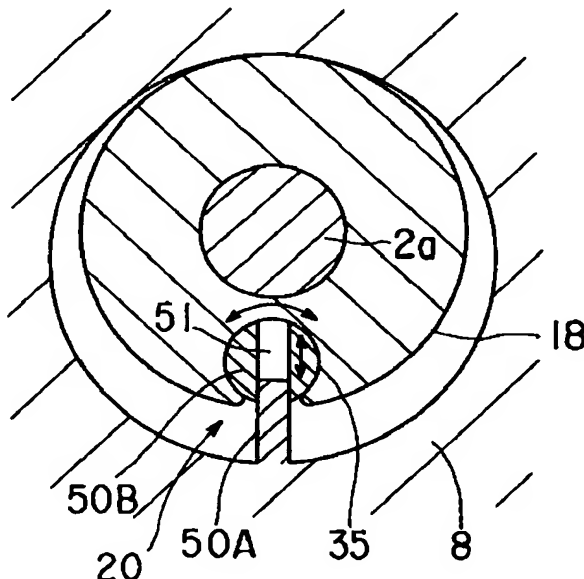
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(54) 【発明の名称】 流体機械

(57) 【要約】

【目的】 本発明は、公転部品の自転規制部材として、往復動摺動する構成を可能な限り少なくして、工数の低減と低コスト化を得るとともに、たとえばブレードストッパなどの他の機能部品との兼用を可能とした流体機械を提供する。

【解決手段】 軸受け具10、11と、この軸受け具に固定され円筒状のシリンダ8と、このシリンダ内に偏心して配置され、かつシリンダに対し公転運動をなすことにより作動流体を移送するローラ18を備え、上記ローラを公転部品、上記シリンダ8を非公転部品として、これら公転部品と非公転部品のいずれか一方のみと往復動摺動して、公転部品の自転を規制する自転規制部材20を備えた。



【特許請求の範囲】

【請求項1】軸受け具と、この軸受け具に固定され、もしくは回転自在に支持される円筒状のシリンダと、このシリンダ内に偏心して配置され、かつシリンダに対し公転運動をなすことにより作動流体を移送するローラあるいはロータピストンを備えた流体機械において、上記ローラあるいはロータピストンなどの公転部品および軸受け具あるいはシリンダなどの非公転部品のいずれか一方のみと往復動摺動して、上記公転部品の自転を規制する自転規制部材を具備したことを特徴とする流体機械。

【請求項2】上記自転規制部材は、上記公転部品あるいは上記非公転部品のいずれか一方と往復動摺動するとともに、回動摺動することを特徴とする請求項1記載の流体機械。

【請求項3】上記自転規制部材は、上記公転部品あるいは上記非公転部品のいずれか一方と往復動摺動し、かつ公転部品あるいは非公転部品のいずれか他方と回動摺動することを特徴とする請求項1記載の流体機械。

【請求項4】上記公転部品と非公転部品との間に、螺旋状に巻回されるとともに、一端側から他端側に漸次ピッチを縮小させたブレードが介在され、上記自転規制部材は、上記ブレードの螺旋方向の移動を規制するブレードストッパを兼用することを特徴とする請求項1記載の流体機械。

【請求項5】上記自転規制部材は、上記公転部品と上記非公転部品との各摺動部に潤滑油を給油する給油ポンプを兼用することを特徴とする請求項1記載の流体機械。

【請求項6】上記自転規制部材は、上記公転部品と上記非公転部品との各摺動部の断面形状が円形であることを特徴とする請求項1記載の流体機械。

【請求項7】上記自転規制部材と、上記公転部品もしくは上記非公転部品は、互いに異なる材質のものが選択されることを特徴とする請求項1記載の流体機械。

【請求項8】上記自転規制部材は、表面処理もしくは熱処理されることを特徴とする請求項1記載の流体機械。

【請求項9】軸受け具と、この軸受け具に固定され、もしくは回転自在に支持される円筒状のシリンダと、このシリンダ内に偏心して配置され、かつシリンダに対し公転運動をなすことにより作動流体を移送するローラあるいはロータピストンを備えた流体機械において、上記ローラあるいはロータピストンなどの公転部品および上記軸受け具あるいはシリンダなどの非公転部品の少なくともいずれか一方と往復動摺動以外の動作によって、上記公転部品の自転を規制する自転規制部材を具備したことを特徴とする流体機械。

【請求項10】上記自転規制部材は、上記公転部品あるいは上記非公転部品のうちの少なくともいずれか一方と回動摺動することを特徴とする請求項9記載の流体機械。

【請求項11】上記自転規制部材は、少なくともその一部が弾性体から構成されることを特徴とする請求項9記載の流体機械。

【請求項12】上記公転部品と非公転部品との間に、螺旋状に巻回されるとともに、一端側から他端側に亘って漸次ピッチを縮小させたブレードが介在され、上記自転規制部材は、上記ブレードの螺旋方向の移動を規制するブレードストッパを兼用することを特徴とする請求項9記載の流体機械。

10 【請求項13】上記自転規制部材は、ボールジョイント継ぎ手から構成されることを特徴とする請求項9記載の流体機械。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、たとえば空気調和機の冷凍サイクルを構成するヘリカルブレード式圧縮機である流体機械に関する。

【0002】

【従来の技術】近年、流体機械として、たとえば空気調和機の冷凍サイクルを構成する圧縮機である、ヘリカルブレード式圧縮機が提案されている。この種の圧縮機によれば、従来のレシプロ式やロータリ式圧縮機におけるシール性不良などを除去でき、比較的簡単な構成によりシール性を向上させて効率のよい圧縮がなされとともに、部品の製造および組立てが容易化される。

【0003】このようなヘリカルブレード式圧縮機において、近時、2種類の圧縮機構部が開発されている。その一方は、軸受け具に両端を固定支持されるシリンダ内に、ローラが偏心配置される。このローラの外周面に螺旋状溝が形成され、ブレードが出入り自在に嵌め込まれる。このブレードとシリンダおよびローラとの間に形成される圧縮室に被圧縮流体である冷媒ガスを導入して圧縮する。

【0004】他方は、軸受け具に両端を回転自在に支持され、かつ駆動源に連結するシリンダ内に、ロータピストンが偏心配置される。このロータピストンの外周面に螺旋状溝が形成され、ブレードが出入り自在に嵌め込まれる。このブレードとシリンダおよびロータピストンとの間に形成される圧縮室に被圧縮流体である冷媒ガスを導入して圧縮する。

【0005】

【発明が解決しようとする課題】ところで、上記軸受け具およびシリンダはその位置が固定的であるのに対して、上記シリンダ内に偏心して配置され冷媒ガスを移送するローラあるいはロータピストンは、シリンダに対し公転運動をなす。

【0006】すなわち、このような圧縮機構部においては、上記ローラあるいはロータピストンのごとき公転部品と、上記軸受け具およびシリンダなどの非公転部品との、2種類に大別できる。

【0007】また、いずれの構成であっても圧縮効率の向上を図るために、上記公転部品の自転を規制する必要がある。図16に従来の公転部品に対する自転規制手段をなす、オルダム機構を示す。

【0008】すなわち、ローラA端面と軸受け具B端面との間にオルダムリングCが介在される。このオルダムリングCの両面には互いに直交する方向に一对の突条dが設けられ、それぞれ対向するローラAおよび軸受け具Bに設けられる長溝eに往復動自在に嵌め込まれる。

【0009】このようなオルダム機構であれば、公転部品であるローラAの自転を確実に規制できる。その反面、公転部品Aと、非公転部品である軸受け具Bそれぞれに突条dおよび長溝eからなる往復動摺動部を設ける必要があり、それらの寸法精度の管理が厳しい。したがって、加工および組立に手間がかかって工数の増大を招き、コストに悪影響を及ぼしている。

【0010】さらに、この種の圧縮機構部は、上記ブレードの螺旋方向の移動を規制するブレードストッパが必要であり、かつ各摺動部へ給油するための給油ポンプも必要であって、それぞれ専用の部品を別途備えなければならず、コストに与える悪影響が加重される傾向にある。

【0011】本発明は上記事情に着目してなされたものであり、その目的とするところは、公転部品の自転を規制する部材に対して、往復動摺動する構成を可能な限り少なくして、工数の低減と低コスト化を得るとともに、たとえばブレードストッパなどの他の機能部品との兼用を可能とした流体機械を提供することにある。

【0012】

【課題を解決するための手段】上記目的を満足するため第1の発明の流体機械は、請求項1として、軸受け具と、この軸受け具に固定され、もしくは回転自在に支持される円筒状のシリンダと、このシリンダ内に偏心して配置され、かつシリンダに対し公転運動をなすことにより作動流体を移送するローラあるいはロータピストンを備え、上記ローラあるいはロータピストンなどの公転部品および軸受け具あるいはシリンダなどの非公転部品のいずれか一方のみと往復動摺動して、上記公転部品の自転を規制する自転規制部材を具備したことを特徴とする。

【0013】上記目的を満足するため第2の発明の流体機械は、請求項9として、軸受け具と、この軸受け具に固定され、もしくは回転自在に支持される円筒状のシリンダと、このシリンダ内に偏心して配置され、かつシリンダに対し公転運動をなすことにより作動流体を移送するローラあるいはロータピストンを備えた流体機械において、上記ローラあるいはロータピストンなどの公転部品および上記軸受け具あるいはシリンダなどの非公転部品の少なくともいずれか一方と往復動摺動以外の動作によって、上記公転部品の自転を規制する自転規制部材を

具備したことを特徴とする。

【0014】このような課題を解決する手段を採用することにより、公転部品に対する自転を規制するのにあたって、往復動自在に摺動する構成を可能な限り少なくして、低コスト化を得るとともに、たとえばブレードストッパなどの他の機能部品との兼用を可能となる。

【0015】

【発明の実施の形態】以下、図面を参照して本発明の一実施の形態について説明する。図1は、流体機械である、いわゆるヘリカルブレード式圧縮機である。このヘリカルブレード式圧縮機は、密閉ケース1内に、回転軸2を介して連結される圧縮機構部3および電動機部4が収容されてなる。

【0016】上記密閉ケース1の上端部には吐出冷媒管6が接続され、側面部には吸込み冷媒管7が接続される。上記吐出冷媒管6から吸込み冷媒管7に亘って順次、凝縮器と、膨張弁と、蒸発器が冷媒管（いずれも図示しない）を介して接続され、これらでたとえば空気調和機の冷凍サイクルが構成される。

【0017】つぎに、上記圧縮機構部3について詳述する。図中8はシリンダであって、このシリンダ8の外周面に一体に突設される鏑部8aが上記密閉ケース1内周壁に嵌合され、密閉ケース1外周側から溶接手段をもって取付け固定される。

【0018】上記シリンダ8の上端開口部は主軸受け具10によって閉塞され、下端開口部は副軸受け具11によって閉塞される。上記主軸受け具10は回転軸2のほぼ中間部を回転自在に軸支し、上記副軸受け具11は回転軸2の下端部を回転自在に軸支する。この副軸受け具11の下面には受け板14が取付けられていて、回転軸2の下端面を支持している。

【0019】主軸受け具10と副軸受け具11との間の回転軸2周面には、偏心クランク部2aと第1のバランサ16および第2のバランサ17が設けられる。上記偏心クランク部2aは回転軸2の軸心とは所定距離だけ偏心して設けられる。上記第1、第2のバランサ16、17は回転軸2の軸心に対する上記偏心クランク部2aの偏心方向とは対称の位置に取付けられ、等質量に形成される。

【0020】上記シリンダ8内に偏心して、ローラ18が配置されている。このローラ18の下端面は上記副軸受け具11に支持され、かつローラ18の回転軸2中心軸に対する偏心量は、偏心クランク部2aの偏心量と同一である。

【0021】上記ローラ18はスリーブを介して上記偏心クランク部2a周面に、回転自在に嵌め込まれる。したがって、回転軸2の回転にともなって偏心クランク部2aが偏心回転すると、ローラ18が偏心運動するとともに、ローラ18の外周面一部は軸方向に沿ってシリンダ8内周面に転接するようになっている。

【0022】また、上記副軸受け具11とローラ18下端部との間には、後述する自転規制部材20が設けられていて、ローラ18の自転を規制して公転運動をなすよう制御する。

【0023】上記ローラ18の周面には、この上端部側から下端部側に亘って、徐々にピッチが小となる螺旋状の溝23が設けられる。螺旋状溝23には螺旋状のブレード24が突没自在に嵌め込まれ、ブレード24の外端面はシリンダ8の内周面に密接状態となっている。

【0024】上記ローラ18とシリンダ8周面との間はブレード24によって連続した複数の空間部に仕切られる。これら空間部を圧縮室25と呼ぶ。上記螺旋状溝23のピッチの設定から、各圧縮室25の容積は上部側圧縮室25から下部側圧縮室25に亘って徐々に大となっている。

【0025】上記電動機部4は、回転軸2に嵌着されるロータ30と、このロータ30の周面に狭小の間隙を介して対向し、上記密閉ケース1の内周面に嵌着されるステータ31とから構成される。

【0026】このようにして構成されるヘリカルブレード式圧縮機であり、電動機部4に通電してロータ30とともに回転軸2を回転駆動する。回転軸2の回転力は、偏心クランク部2aを介してローラ18に伝達される。

【0027】上記自転規制部材20は、後述するようにしてローラ18の自転を規制するので、このローラ18は公転運動をなす。ローラ18の公転運動にともなう、シリンダ8に対する転接位置が周方向に漸次移動する。上記ブレード24は、螺旋状溝23に対して出入りしながらローラ18の半径方向に突没移動する。

【0028】これらの一連の作動により、蒸発器から低圧の冷媒ガスが吸込み冷媒管7を介して最下部圧縮室25に吸込まれる。そして、ローラ14の公転運動にともなう上部側の圧縮室25へ順次移送される。

【0029】上記各圧縮室25の容積が下部側から上部側に亘って順次縮小しているため、冷媒ガスは各圧縮室25を順次移送される間に圧縮され、最上端の圧縮室25において所定圧まで高圧化する。この圧縮室25内の高圧ガスは一旦密閉ケース1内に吐出され、ここで充填してから吐出冷媒管6から凝縮器へ導かれ、周知の冷凍サイクル作用が行われる。

【0030】このようにして構成され、かつ作用するヘリカルブレード式圧縮機において、上記自転規制部材20は以下に述べるようにして構成され、かつ作用する。なお、自転規制部材20は、公転部品であるここではローラ18の非公転部品であるここではシリンダ8に対する自転を規制するものである。したがって、以下、ローラを公転部品18と呼び、シリンダを非公転部品8と呼ぶ。

【0031】図2は、請求項1ないし請求項3の発明に係る、第1の実施の形態を示す自転規制部材20を示

す。上記自転規制部材20は、非公転部品8の内径側へ突出する突起部材50Aと、公転部品18に回動自在に嵌め込まれる回動部材50Bとから構成される。なお説明すれば、上記突起部材50Aは管体もしくは板体からなり、非公転部品8から一体に突出され、もしくは別体であってその基端部を適宜な手段で非公転部品8に取付け固定される。

【0032】上記回動部材50Bは円柱体もしくは球体からなり、少なくとも断面円形状をなす。この軸方向長さは突起部材50Aの紙面方向の長さに対応している。そして、公転部品18の外周部に設けられる一部が開放した断面円形の凹溝部35に周方向に変動自在、換言すれば回動自在に嵌まり込まれている。

【0033】この回動部材50Bには、径方向に亘って掛合用孔51が貫通して設けられ、公転部材18の位置に拘わらず上記突起部材50Aの一部が挿入状態にある。すなわち、掛合用孔51に突起部材50Aが往復動自在に嵌め込まれている。

【0034】しかして、公転部品18の非公転部品8に対する転接位置が図のように最上部にある状態から、公転部品18が時計回り方向に偏心回転しようとする、公転部品18に嵌め込まれている回動部材50Bの位置も変動する。

【0035】一方、回動部材50Bの掛合用孔51に挿入する突起部材50Aの位置が変わらないので、回転軸2が90°回転した状態で公転部品18は回動部材50Bに対してその分だけ回動して傾く。

【0036】同時に、掛合用孔51が突起部材50Aに深く挿入し、この突出端面が掛合用孔51の略半分程度の位置まで往動する。さらに90°回動すると、公転部品18の非公転部品8に対する転接位置は図の180°反対側の位置に変わり、突起部材50Aは掛合用孔51に最も深く挿入される。

【0037】この位置から公転部品18の非公転部品8に対する転接位置がさらに時計回り方向に変動するのにともなう、今度は回動部材50Bの掛合用孔51が突起部材50Aから抜け出る方向に移動する。

【0038】換言すれば、回動部材50Bは公転部品18とともに復動する。そして、公転部品18の非公転部品8に対する転接位置が図の状態に戻ったところで、復動が完了して往動に変わり、以下先に述べた作用を繰り返す。

【0039】結局、自転規制部材20においては、非公転部品8と一体の突起部材50Aに対して公転部品18と一体の回動部材50Bが往復動摺動し、回動部材50Bは公転部品18と回動摺動して、公転部品18に対する自転を規制し公転運動を行わせる。

【0040】なお、上記第1の実施の形態における変形例として、図3に示すような自転規制部材20Aに換えてもよい。すなわち、ここでは公転部品18の周面から

突起部材50Aが突出され、掛合用孔51を有する回動部材50Bは非公転部品8に設けられる一部が開放した断面円形の凹溝部36に回動自在に嵌め込まれる。

【0041】このようにして構成される自転規制部材20Aを備えることにより、非公転部品8と一体の回動部材50Bに対して公転部品18と一体の突起部材50Aが往復動摺動し、回動部材50Bは非公転部品8と回動摺動して、公転部品18に対する自転を規制し公転運動を行わせる。

【0042】図4は、請求項1ないし請求項3の発明に係わる、第2の実施の形態の自転規制部材20Bを示す。この自転規制部材20Bは、非公転部品8に設けられる一部が開放される断面円形状の凹溝部36に回動自在に嵌め込まれる回動部55aと、この回動部55aから一体に突設され公転部品18周面から径方向に設けられる掛合用溝37に往復動自在に嵌め込まれる突起部55bとから構成される。

【0043】この場合、公転部品18の掛合用溝37に対して突起部55bが往復動摺動をなし、回動部55aが非公転部品8に対して回動摺動して、公転部品18に対する自転を規制し公転運動を行わせる。

【0044】なお、上記第2の実施の形態における変形例として、図5に示すような自転規制部材20Cに換えてもよい。すなわち、ここでは回動部55aが公転部品18に設けられる凹溝部39に回動自在に嵌め込まれ、これと一体の突起部55bが非公転部品8に設けられる掛合用溝38に往復動自在に嵌め込まれる。

【0045】このようにして構成される自転規制部材20Cを備えることにより、非公転部品8の掛合用溝38に対して突起部55bが往復動摺動をなし、回動部55aが公転部品18に対して回動摺動して、公転部品18に対する自転を規制し公転運動を行わせる。

【0046】図6は、請求項1ないし請求項3の発明に係わる、第3の実施の形態の自転規制部材20Dを示す。上記自転規制部材20Dは、非公転部品8に設けられ、この内周面に開放する断面ほぼU字状の凹溝部40に枢支ピン60を介して回動自在に挿入される回動レバー61からなる。

【0047】回動レバー61の幅寸法に対して凹溝部40の幅寸法は充分な余裕を持った広い幅に形成され、したがって回動レバー61は凹溝部40において所定角度の範囲で回動自在である。回動レバー61の非公転部品8内径から突出する端部は、公転部品8に設けられる掛合用溝41に往復動自在に嵌め込まれる。

【0048】この場合、公転部品18の掛合用溝41に対して回動レバー61が往復動摺動をなすとともに枢支ピン60を支点として非公転部品8に対して回動し、公転部品18に対する自転を規制して公転運動を行わせる。

【0049】なお、上記第3の実施の形態における変形

例として、図7に示すような自転規制部材20Eに換えてもよい。すなわち、ここでは回動レバー61の一端部が枢支ピン60を介して公転部品18に回動自在に枢支され、この回動レバー61の他端部は非公転部品8に設けられる掛合用溝43に往復動自在に掛合される。

【0050】このようにして構成される自転規制部材20Eを備えることにより、非公転部品8の掛合用溝43に対して回動レバー61端部が往復動摺動をなし、かつ回動レバー61が公転部品18に対して回動するが、公転部品18に対する自転を規制して公転運動を行わせることとなる。

【0051】図8(A)(B)は、請求項4の発明に係わる、第4の実施の形態の自転規制部材20F、20Gを示す。はじめに、図8(A)の自転規制部材20Fから説明すると、非公転部品8の内径側へ突出する突起部材50Aと、公転部品18に回動自在に嵌め込まれる回動部材50Bとから構成される。この回動部材50Bに掛合用孔51が設けられ、突起部材50Aの一部が往復動自在に嵌め込まれている。

【0052】このように自転規制部材20Fの構成は、先に図2で説明した構成のものと全く同一でよい。ここでは自転規制部材20Fの取付け位置として、ブレード24端面と対向する位置が選択されることが特徴である。

【0053】すなわち、上記突起部材50Aは非公転部品8の端部に突出しており、回動部材50Bは公転部品18の端部に設けられる凹溝部35aに掛合している。このことから、突起部材50Aの側面はブレード24端面と対向する。

【0054】したがって、自転規制部材20Fは公転部品18の自転を規制する一方で、公転部品18の公転運動とともに螺旋方向に移動しようとするブレード24の端面を衝止し、この移動規制をなすブレードストップを兼用する。

【0055】図8(B)に示す自転規制部材20Gは、非公転部品8に設けられ、この内周面に開放する断面ほぼU字状の凹溝部40に枢支ピン60を介して回動自在に挿入される回動レバー61からなる。

【0056】このように自転規制部材20Gの構成は、先に図6で説明した構成のものと全く同一でよい。ここでは自転規制部材20Gの取付け位置として、ブレード24端面と対向する位置が選択されることが特徴である。

【0057】すなわち、上記回動レバー61は非公転部品8の端部から突出するとともに、公転部品18の端部に設けられる掛合用溝41に掛合している。このことから、回動レバー61の側面はブレード24端面と対向する。

【0058】したがって、この自転規制部材20Gは公転部品18の自転を規制する一方で、公転部品18の公

転運動にともなって螺旋方向に移動しようとするブレード24の端面を衝止し、この移動規制をなすブレードストッパを兼用する。

【0059】図9(A)(B)に、請求項5の発明に係わる、第5の実施の形態の自転規制部材20Hを示す。この自転規制部材20Hは、非公転部品8の凹溝部35に回動自在に嵌め込まれる回動部材50Cと、公転部品8に突設され回動部材50Cの掛合用孔51に嵌め込まれる突起部材50Aとから構成される。

【0060】そして、回動部材50Cには掛合用孔51と直交する方向で、この中途部に連通する分岐孔44が設けられる。また、非公転部品8には、凹溝部35と図1に示す潤滑油の油溜り部5とを連通する油吸上げ路45aが設けられるとともに、公転部品18と非公転部品8との各摺動部と凹溝部35とを連通する給油路45bが設けられる。

【0061】上記凹溝部35に対して油吸上げ路45aと給油路45bの開口端位置は互いに相反する位置が選択され、かつ上記油吸上げ路45aは回動部材50Cの位置によっては分岐孔44と連通し、上記給油路45bは回動部材50Cの位置によっては掛合用孔51と連通する。

【0062】図9(A)に示すように、公転部品18の公転運動にともなって突起部材50Aが抜け出る方向に移動(すなわち復動)している状態で、所定角度に傾いたとき分岐孔44と油吸上げ路45aとが連通する。

【0063】このとき給油路45bに対して掛合用孔51端部がずれた位置にあり、給油路45bと掛合用孔51の端部相互が互いに閉成状態にある。したがって、分岐孔44と掛合用孔51はいわば負圧状態になり、油溜り部5の潤滑油が油吸上げ路45aを介して吸上げられる。

【0064】吸上げられた潤滑油は掛合用孔51と分岐孔44に溜まる。さらに、公転部品18の公転運動にともなって突起部材50Aとともに公転部品18が傾き、かつ突起部材50Aが掛合用孔51内に挿入(すなわち往動)していく状態で、分岐孔44の油吸上げ路45aに対する位置がずれて互いに閉成される。

【0065】その一方で、掛合用孔51が給油路45bに連通し、かつ突起部材50Aの往動が継続するので、掛合用孔51と分岐孔44に溜まっていた潤滑油は突起部材50Aに押圧されて給油路45bに導かれ、さらに各摺動部に給油される。

【0066】このように、非公転部品8に油吸上げ路45aを設けて油溜り部5に連通させ、かつ給油路45bを設けて各摺動部に連通することを前提として、自転規制部材50Cは公転部品18の自転を規制するとともに給油ポンプを兼用する。

【0067】請求項6の発明に係わる実施の形態として、図2ないし図9で説明した突起部材50A、突起部

55b、回動レバー61をすべて丸棒状のものをを用い、これと掛合する掛合用孔51、掛合用溝37、38、41の断面を円形となす。

【0068】このことにより、これらの製造加工が容易となり、さらなる低コスト化に寄与する。請求項7の発明に係わる実施の形態として、図2ないし図9で説明した自転規制部材20、20A~20Hと、公転部品18および非公転部品8は、互いに異なる材質のものから形成される。

10 【0069】このことにより、往復動摺動部材である突起部材50A、突起部55b、回動レバー61の非往復摺動部材に対する硬度が高くなって、摩耗に耐え、長寿命化を得られて信頼性の向上を図れる。

【0070】請求項8に係わる実施の形態として、図2ないし図9で説明した突起部材50A、突起部55b、回動レバー61のすべて周面を表面処理をなす。もしくは熱処理をなす。

20 【0071】このことにより、往復動摺動部材である突起部材50A、突起部55b、回動レバー61の非往復摺動部材に対する硬度が高くなって、摩耗に耐え、長寿命化を得られて信頼性の向上を図れる。

【0072】図10に、請求項9および請求項10の発明に係わる、第6の実施の形態の自転規制部材20Jを示す。自転規制部材20Jは、その一端部が枢支ピン52を介して公転部品18に回動自在に枢支され、他端部が非公転部品8に設けられる長孔用ピン53に掛合するレバー54からなっている。

30 【0073】すなわち、レバー54は一端部の枢支ピン52を支点として他端部が回転可能であるが、レバー54の他端部は、ここに設けられる長孔54aが長孔用ピン53に掛合するところから、長孔54aの範囲内で移動可能である。

【0074】このような自転規制部材20Jであり、非公転部品8に対する公転部品18の転接位置が図のように最上部にあるとき、長孔用ピン53がレバー長孔54aの最下端に掛合している。

40 【0075】非公転部品8に対する公転部品18の転接位置が図とは180°反対側の最下部に移動した状態で、長孔用ピン53がレバー長孔54aの最上端に変わる。これらの間は長孔用ピン53がレバー長孔54aの中間部にある。

【0076】上記自転規制部材20Jを備えることにより、非公転部品8に設けられる長孔用ピン53に対してレバー54が長孔54aの範囲内で移動しながら、公転部品18に設けられる枢支ピン52に対して回動摺動し、公転部品18に対する自転を規制して公転運動を行わせることとなる。

50 【0077】図11に、請求項11の発明に係わる、第7の実施の形態の自転規制部材20Kを示す。この自転規制部材20Kは、一端部56aが公転部品18に設け

られるピン52aに掛合され、他端部56bが非公転部品8に設けられるピン53aに掛合される弾性体であるワイヤスプリング56からなっている。

【0078】すなわち、ワイヤスプリング56は、その両端部56a、56bが複数ターンづつ巻回され、それぞれピン52a、52bに掛合される。ワイヤ状であるから、各端部56a、56bから内側への力が付勢されれば弾性変形する。

【0079】しかして、公転部品18の非公転部品8に対する転接位置が変動すると、ワイヤスプリング56の一方の端部56bが固定である一方、他方の端部56aが変動する。

【0080】したがって、ワイヤスプリング56の中途部が弾性変形して全体的に捻み、公転部品18における自転を規制して公転運動を行わせる。すなわち、自転規制部材20Lは公転部品18と、非公転部品8とのいずれとも往復動以外の動作によって、公転部品18の自転を規制する。

【0081】図12に、請求項11の発明に係わる、第8の実施の形態の自転規制部材20Lを示す。この自転規制部材20Lは、公転部品18外周面における180°対向する部位に設けられる一対の凹溝部57と、非公転部品8内周面における180°対向する部位に設けられる凹溝部58と、互いに対向する公転部品18の凹溝部57と非公転部品8の凹溝部58とに亘って設けられる弾性体である一対のコイルスプリング59とから構成される。

【0082】上記コイルスプリング59を引張りばねとして用いる場合、この両端部は各凹溝部57、58底面に適宜な手段で確実に取付け固定され、公転部品18と非公転部品8とを互いに接近する方向に弾性的に押圧付勢する。

【0083】また、コイルスプリング59を圧縮ばねとして用いる場合、この両端部は各凹溝部57、58底面のほぼ全体に亘って当接させて安定性を確保し、公転部品18と非公転部品8とを互いに離間する方向に弾性的に押圧付勢する。

【0084】いずれにしても、一対のコイルスプリング59が180°対向する位置に設けられるところから、非公転部品8に対する公転部品18の転接位置が変動するのにもなって、一方のコイルスプリング59が圧縮変形する一方で、他方のコイルスプリング59は伸長変形する。

【0085】結局、公転部品18は一対のコイルスプリング59によって自転を規制される。すなわち、ここでも自転規制部材20Kは公転部品18と、非公転部品8とのいずれとも往復動以外の動作によって、公転部品18の自転を規制する。

【0086】図13に、請求項11の発明に係わる、第9の実施の形態の自転規制部材20Mを示す。この自転

規制部材20Mは、公転部品18外周面の所定部位に設けられる凹溝部70と、この凹溝部70とほぼ対向する非公転部品8内周面部位に設けられる凹溝部71と、互いに対向する凹溝部70、71とに亘って設けられる弾性体である板ばね72とから構成される。

【0087】上記板ばね72は、その両端部を取付け具73を介して凹溝部70の底面と、凹溝部71の側面に確実に取付け固定され、ほぼL字状に屈曲形成された状態となっていてところから、非公転部品8に対して公転部品18を互いに離間する方向に弾性的に押圧付勢している。

【0088】しかして、非公転部品8に対する公転部品18の転接位置が変動するのにもなって、一端部が非公転部品8に取付け固定された板ばね72の他端部が弾性変形をなして公転部品18の自転を規制する。

【0089】すなわち、ここでも自転規制部材20Mは公転部品18と、非公転部品8とのいずれとも往復動以外の動作によって、公転部品18の自転を規制する。図14に、請求項12の発明に係わる、第10の実施の形態の自転規制部材20Nを示す。

【0090】この自転規制部材20Nは、非公転部品8の内周面所定部位にその一端部が圧入固定され、他端部が公転部品18の内周面に取付け具75を介して取付けられる押圧片74からなる。

【0091】すなわち、押圧片74の非公転部品8における取付け部74aは、所定の板厚を有する剛体である。そして、取付け部74aは上記ブレード24の端面と対向する位置に取付けられていて、公転部品18端面に設けられる切欠き溝76に挿通して内径側に突出する。

【0092】また、押圧片74の公転部品18内周面に取付けられる片部74bは、ごく薄い板厚に形成され弾性を有する。その形状から公転部品18外周面を非公転部品8内周面に当接するよう弾性的に押圧付勢している。

【0093】しかして、非公転部品8に対する公転部品18の転接位置が変動するのにもなって、非公転部品8に固定された押圧片74の公転部品18に取付けられた片部74bが弾性変形をなして公転部品18の自転を規制する。

【0094】すなわち、自転規制部材20Nは公転部品18と、非公転部品8とのいずれとも往復動以外の動作によって公転部品18の自転を規制する。そのうえ、押圧片74の非公転部品8から内径側に突出する取付け部74aはスリーブ24の端面を衝止して螺旋方向の移動を規制するブレードストップの機能を兼用する。

【0095】図15は、請求項13の発明に係わる、第11の実施の形態の自転規制部材20Pを示す。上記自転規制部材20Pは、ボールジョイント継ぎ手77と、この取付け手段からなる。すなわち、このボールジョイ

ント継ぎ手77は、直状部77aの両端にボール部77b、77cが一体に設けられている。一方のボール部77bはここでは副軸受け具である非公転部品11に設けられる凹溝部78に回動自在に嵌め込まれ、他方のボール部77cは公転部品18に設けられる図示しない凹溝部に回動自在に嵌め込まれる。

【0096】公転部品18の転接位置が変動すると、上記ボールジョイント継ぎ手77の一方のボール部77bが非公転部品11に掛合しているところから、ボールジョイント継ぎ手77の方向(向き)が変わる。すなわち、自転規制部材20Pは、公転部品18と、非公転部品11とのいずれとも往復動摺動以外の動作によって、公転部品18の自転を規制することとなる。

【0097】なお、上述した各実施の形態においては、固定のシリンダ内に偏心配置したロータが公転運動をなすヘリカルブレード式流体圧縮機に適用して説明したが、これに限定されるものではなく駆動源に連結され回転駆動されるシリンダ内にロータピストンを偏心配置するとともに公転運動させるタイプのヘリカルブレード式流体圧縮機(たとえば、特公平7-107391号に開示される)に適用してもよい。あるいは、圧縮機ばかりでなく、流体を圧送するポンプや膨張機など、他の流体機械にも適用可能である。

【0098】

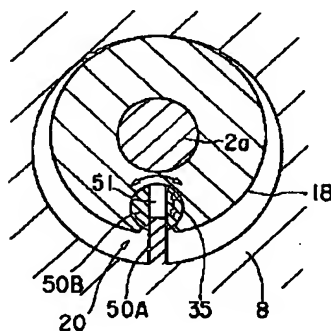
【発明の効果】以上説明したように本発明によれば、公転部品に対する自転を規制するのにあたって、往復動自在に摺動する構成を可能な限り少なくして、低コスト化を得るとともに、たとえばブレードストップなどの他の機能部品との兼用を可能となり、コストダウンに寄与するとともに製造性の向上を得るなどの効果を奏する。

【図面の簡単な説明】

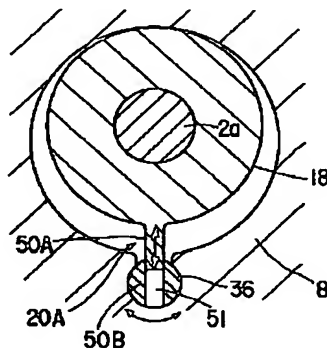
【図1】本発明の一実施の形態に係わる、流体機械であるヘリカルブレード式圧縮機の断面図。

【図2】第1の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。 *

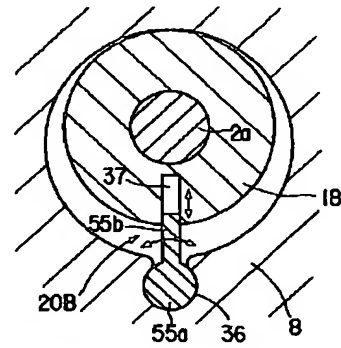
【図2】



【図3】



【図4】



* 【図3】第1の実施の形態の変形例。

【図4】第2の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図5】第2の実施の形態の変形例。

【図6】第3の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図7】第3の実施の形態の変形例。

【図8】第4の実施の形態に係わる、ブレードストップを兼用する互いに異なる自転規制部材の構成図。

10 【図9】第5の実施の形態に係わる、給油ポンプを兼用する自転規制部材の構成図。

【図10】第6の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図11】第7の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図12】第8の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図13】第9の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

20 【図14】第10の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図15】第11の実施の形態に係わる、非公転部品に対する公転部品の自転を規制する自転規制部材の構成図。

【図16】従来の自転規制手段であるオルダム機構の構成図。

【符号の説明】

10…主軸受け具、

11…副軸受け具、

8…シリンダ(非公転部品)、

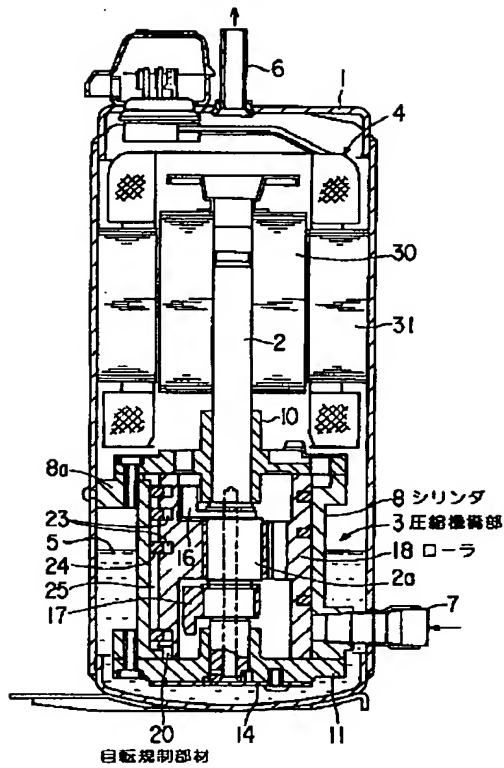
18…ローラ(公転部品)、

20, 20A~20P…自転規制手段、

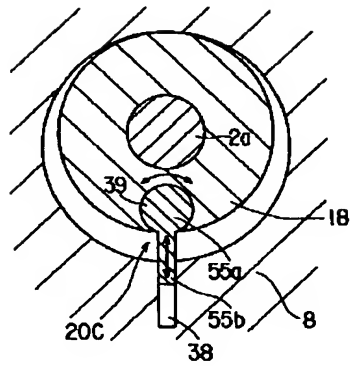
24…ブレード、

5…油溜り部。

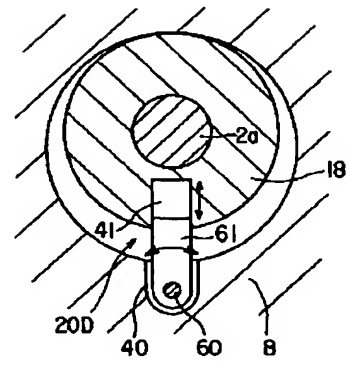
【図1】



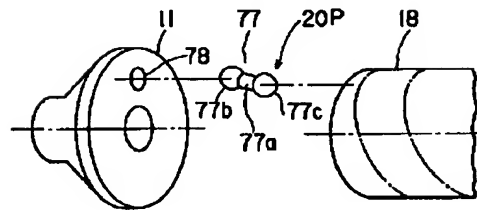
【図5】



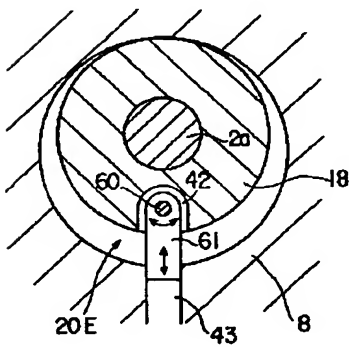
【図6】



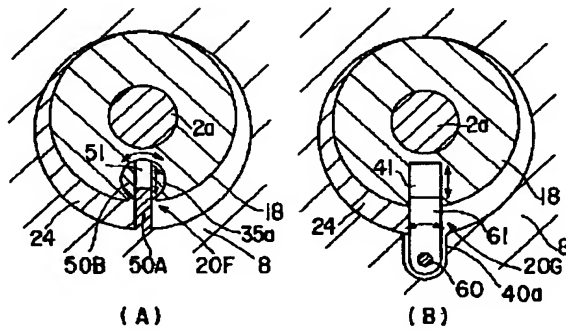
【図15】



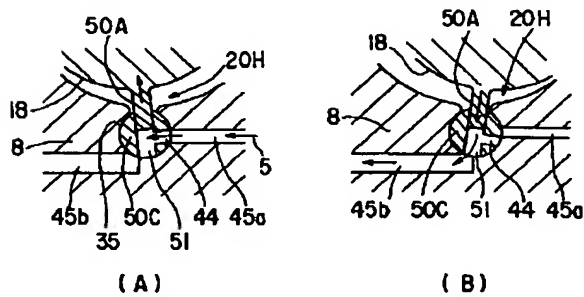
【図7】



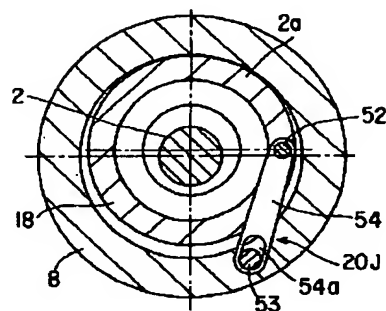
【図8】



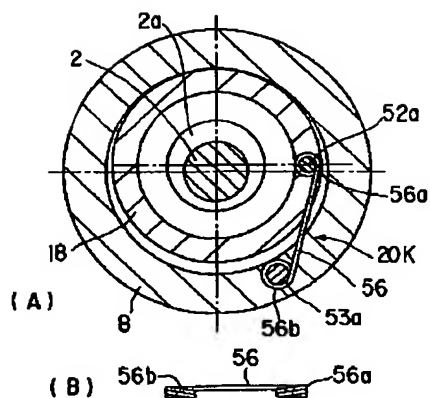
【図9】



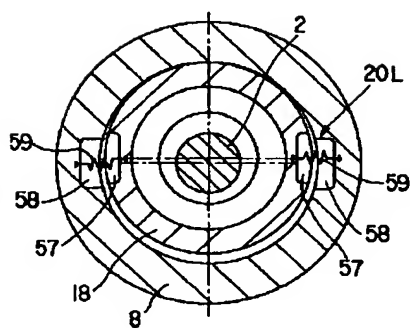
【図10】



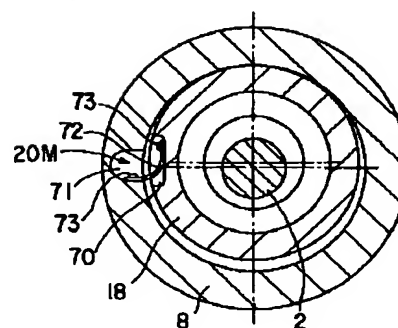
【図11】



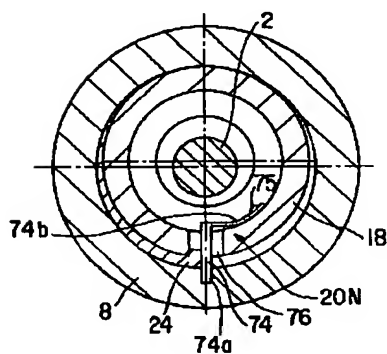
【図12】



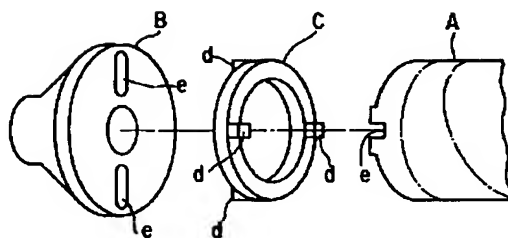
【図13】



【図14】



【図16】



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